Odyssey of the Eyes
Beginning Level

Purpose

To familiarize students with the concept of modeling as it is related to remote sensing.

Overview

In Odyssey of the Eyes, students will create a 3-D model of an area and develop a classification system for the land forms in their model. They will use their eyes as remote sensors and view the model from a variety of heights. The eyes will journey from very close to as far away as a satellite. Each time the student will create a map of the image they see. The maps can then be used to answer certain questions about the environment.

Time

Three to four class periods

Level

Beginning

Prerequisites

The students should be briefed on some very basic components about maps and models such as map keys and symbols.

Key Concepts and Skills

Concepts

A map is a symbolic representation of a certain land area.
The field of view is how large an area your eye or a camera's eye can perceive.
The field of view increases the higher the eye is relative to the ground.

Skills

Modeling a landscape
Drawing the landscape from various perspectives

Materials and Tools

Paper towel or toilet paper tubes
A variety of objects to make the models (either teacher or student supplied).
Glue
Tape
Ruler

Preparation

Gather all materials prior to the building of the model.

Prerequisites

None

Note: This activity presents concepts similar to those in steps 8, 9, and 10 of the Relative and Absolute Directions learning activity in the GPS Investigation.

Background

Maps are the most common model to represent the Earths' surface. The concepts of mapping and modeling are important in order for students' to understand the remote sensing protocols. For example, the satellite images that the students will view during the protocols are models of the Earth taken from satellites.

As a satellite revolves around the Earth, it takes pictures with a sensor that is sensitive to a variety of different wavelengths. One of the main wavelengths sensed is thermal radiation. The sensor reads the amount of heat being radiated and makes a picture out of the different values. In this activity students themselves will be acting as remote sensors of thermal radiation.

Although students may not know it, they have a great deal of experience with remote sensing. Anytime they observe something without touching it they are actually using their eyes, ears, nose, and skin surface to remotely sense that object. We may think of remote sensing as work that is only done by satellites, yet there are many instruments that are used to remotely sense objects. Your students may have experience in photography or in using a microscope. Both of these instruments give us information that we would not be able to access if we attempted to observe an object with our own, limited, senses.

The satellite images students will use in the protocols are made up of tiny squares, each square contains information about a certain land cover area. We call these photos digital. The tiny squares seen on these pictures are called **pixels.** Some images have pixels that represent a large area on the ground and others have pixels that represent smaller areas.

Scientists who study land cover use a variety of aerial photography and satellite images dependent on the purpose of their study. The GLOBE scientists are interested in analyzing the satellite photos to determine land cover types and land use changes over time.

In the remote sensing protocol, we are creating a thematic map of a 15 x 15 km area with your school near the center. The information on the image you receive has been accumulated from a satellite. Your students will be classifying the land cover types with the use of the computer and also conducting ground verification of the resulting image. It is important for them to understand the concepts of modeling and remote sensing if they are to have a clear understanding of where this information comes from and the significance of it.

Resources: (Optional)

Looking Down, Jenkins, Steve, Hutton Houghton Mifflin, NY, 1995, 0-395-72665-4

View from the Air, Lindberg, R., Viking, NY, 1995, 0-670-84660-0

Mouse Views, McMillan, B., Holiday House, NY, 1995, 0-8234-1132-x

What To Do and How To Do It

Part I.
Building and Viewing the Model

1. Students form groups and write a plan for building a model of an area, real or imagined. The school yard is a popular choice, however, the design of the model should be student generated. Students should list materials necessary and draw a proposed picture of their model. See Odyssey of the Eye's registration form found after Odyssey of the Eyes: Advanced Level.
2. Students will need two to three class periods to build their models.

3. Students will now use their eyes to view the model through a paper towel tube from four different views. This will give students an opportunity to view a change in **resolution** and a change in **field of view.** Have students record their observations on Odyssey of the Eyes Observation Form found after Odyssey of the Eyes: Advanced Level.

3a. Mouse View — Observe the model from the side. Draw and label the map.

3b. Bee's View — Observe from 10 cm above the model. Draw and label the map.

3c. Bird's Eye View — Observe from desk level. Draw and label the map.

3d. Satellite View — Observe from a second story window or stairwell. Draw and label the map.

Discussion questions

1. Are there any visual differences between the Bee's View and the Mouse's View? What are they?

   Teacher's Note: Young elementary school children often have more difficulty with the concept of "top view." Some extra time may be needed here. See resource list for suggested resources.

2. Compare your four drawings. Which view would be the most useful if you were:

   a. An eagle looking for a mouse?
   b. Deciding where to build a mall?
   c. Looking for animal tracks?
   d. Studying the extent of deforestation or reforestation?
   e. Finding a lost child in the woods?
   f. Seeing how much of the forests of your area have been damaged by pollution?
   g. Looking for a lost pin?

3. What are the advantages of using satellites to view the Earth? Are there any disadvantages?

Part II.
Making a symbolic map of the model

1. For each land cover item in the model (roads, rocks, playground equipment, pond, river, grass, houses, etc.), have students pick a symbol to represent it. List the land cover items with their symbol in the Odyssey of the Eyes Symbolic Map Data Sheet found after Odyssey of the Eyes Advanced Level.

2. Use the symbols to create a map of this area. Draw the map on the Symbolic Map Data Sheet found after Odyssey of the Eyes: Advanced Level.

3. Student groups exchange symbolic maps, decipher the maps, and write a fictional story about an event that could occur within the depicted environment.

Discussion questions

1. If you were asked to make a map of your neighborhood would you prefer to draw a true to life map or a map using symbols? Support your answer.

2. Research map types and the purpose for each map type.